DOCUMENT RESUME

ED 052 666 FL 002 446

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TITLE A System of Study Materials for the Teaching of Foreign Languages.
INSTITUTION School of Education, Malmo (Sweden). Dept. of Educational and Psychological Research.
PUB DATE 69
NOTE 35p.; Reprint No. 72 from Didakometry and Sociometry, n1 p91-124 1969

EDRS PRICE EDRS Price MF-$0.65 HC-$3.29
DESCRIPTORS *Curriculum Development, Educational Objectives, German, *Instructional Materials, Instructional Program Divisions, *Language Instruction, Lesson Plans, *Material Development, *Modern Languages, Teacher Developed Materials, Teaching Methods
IDENTIFIERS *Sweden

ABSTRACT

An outline of principles for the construction of study materials is presented, including: (1) an analysis of prerequisites: goals, pupils, and language; (2) analysis of the educational process in experiments on method; (3) analysis of products with tests of various kinds; and (4) a description of the process of constructing study materials according to the results obtained through points 1-3. The survey of the principles for the construction of study materials for language teaching is presented on two levels. One consists of general principles and ideas, often supported in the literature, and the other of examples, often taken from a project aimed at producing study material in German for the comprehensive school. The project is called "Methods of Teaching German" and is part of the research and development work which is backed by the National Board of Education in Sweden. (Author)

reprint
from

Department of Educational and Psychological Research
School of Education, Malmö, Sweden

No. 72

ED052666

A SYSTEM OF STUDY MATERIALS FOR THE TEACHING OF FOREIGN LANGUAGES

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OFFICE OF EDUCATION

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FL002446

Didakometry & Sociometry, 1969, 1, 91–124

ED052666

A system of study materials for the teaching of foreign languages: Principles and examples

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Lindell, E. A system of study materials for the teaching of foreign languages: Principles and examples. *Didakometry & Sociometry,* 1969, *1,* 91—124. — An outline of principles for the construction of study materials is presented, including: 1) analysis of prerequisites: goals, pupils and language 2) analysis of the educational process in experiments on method 3) analysis of products with tests of various kinds and, finally, 4) a description of the process of constructing study materials according to the results obtained through points 1—3. The examples summarise very briefly the results of a project on German in the Swedish comprehensive school.

This survey of the principles for the construction of study materials for language teaching is on two levels. One consists of general principles and ideas, often supported in the literature, the other of examples, often taken from a project aimed at producing study material in German for the comprehensive school. The project is called 'Methods of teaching German' (in Swedish, 'Undervisningsmetodik i tyska' — UMT) and is part of the research and development work which is backed by the National Board of Education, primarily through department L4.

This paper was originally written for a symposium held in Kungälv 1968 on study materials and will be published in Swedish in the series, 'Scandinavian Reports'. Here it is partly re-written and has taken a form suggested by Bjerstedt (Skolan

och det pedagogiska utvecklingsarbetet. [The school and the work on educational development.] Lund: Gleerups, 1968, page 50).

1. Analysis of prerequisites

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1. Analysis of prerequisites

1.1. Analysis of objectives

Under this heading we have differentiated between consumer and tolerance studies. Both make use of consumer assessments, however: from Swedish industrial and commercial organisations in the first case and from German-speaking persons in the second.

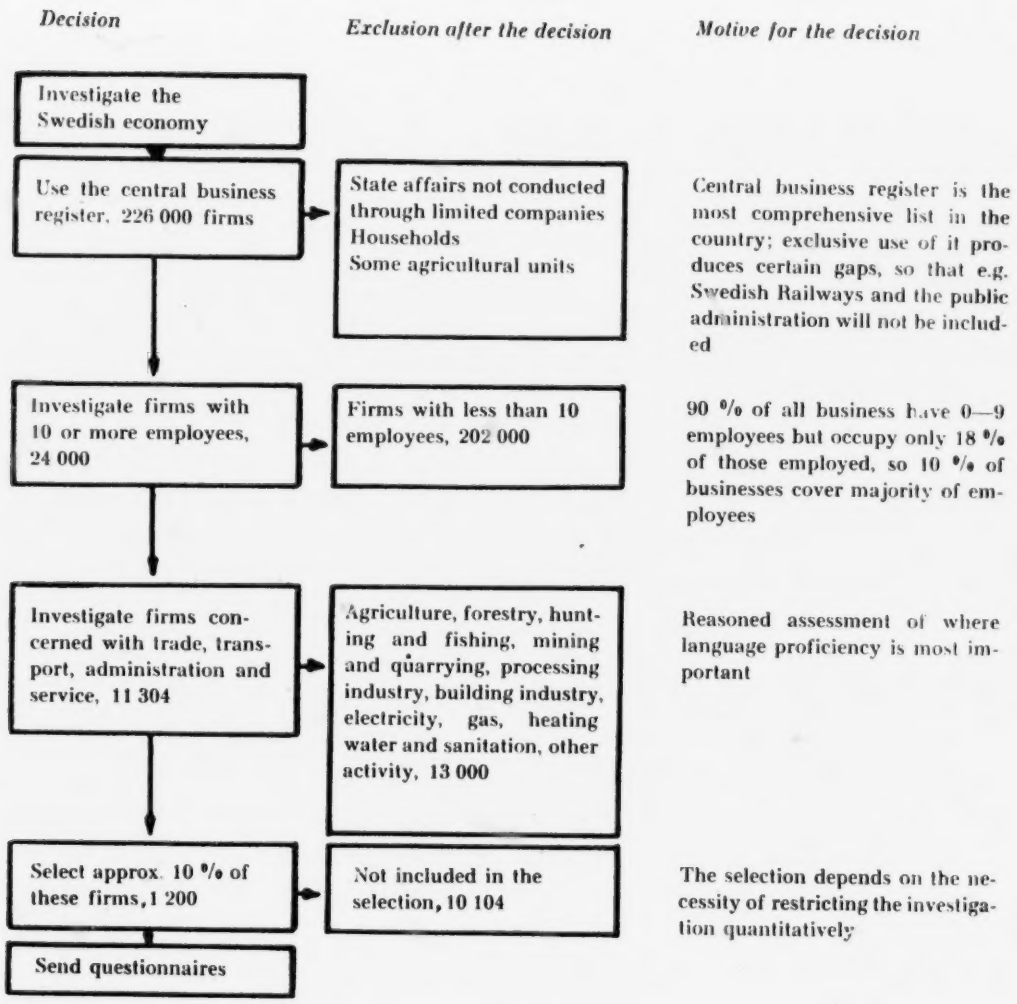
1.1.1. "Consumer" studies

When assessing the various language activities, such as listening and speaking, reading and writing, an investigation of the needs of the consumers can be of interest. When it comes to foreign languages, the most detailed study of these needs in Sweden was carried out by Dahllöf, when examining the demands on the gymnasium, in connection with the reform of the Swedish gymnasium. He found that what was wanted above all was the ability to read and understand texts in foreign languages. Within the R&D project, "Teaching methods in English" (known as UME — Undervisningsmetodik i engelska), Ahlquist has investigated the proficiency in English needed by an average group of Swedes. A new aspect appeared here: what was needed most was the passive language accomplishments: listening and reading with understanding. Speaking and writing were graded much lower. When the national curriculum for Swedish schools was written, the importance of the spoken language was stressed, however.

As an example of a consumer investigation, the program is given below of a study being made of the need for various language activities in German in certain branches of the Swedish economy. The work is being carried out within the project. The outline given in example 1 shows the procedure followed.

The questionnaires aim primarily at getting the four language activities, listen and speak, read and write, graded. On the other hand, it is not the job of the investigation to establish

Example 1. The decision process in planning a consumer study in German.


Decision
Exclusion after the decision
Motive for the decision
Investigate the Swedish economy
Use the central business register, 226 000 firms
State affairs not conducted through limited companies
Households
Some agricultural units
Central business register is the most comprehensive list in the country; exclusive use of it produces certain gaps, so that e.g. Swedish Railways and the public administration will not be included
Investigate firms with 10 or more employees, 24 000
Firms with less than 10 employees, 202 000
90 % of all business have 0—9 employees but occupy only 18 % of those employed, so 10 % of businesses cover majority of employees
Investigate firms concerned with trade, transport, administration and service, 11 304
Agriculture, forestry, hunting and fishing, mining and quarrying, processing industry, building industry, electricity, gas, heating water and sanitation, other activity, 13 000
Reasoned assessment of where language proficiency is most important
Select approx. 10 % of these firms, 1 200
Not included in the selection, 10 104
The selection depends on the necessity of restricting the investigation quantitatively
Send questionnaires

the absolute need for knowledge of German within various branches of the economy.

During the working year 1969—1970, the requirements and aims of the voluntary adult education organisations will be established via organisations such as ABF (=Workers' Educational Association) and TBV (=Salaried Employees' Educational Association). It is possible that professional requirements differ from those of spare-time interests.

Literature:

Dahllöf, U. *Kraven på gymnasiet.* (The demands on the 'gymnasium'.) Stockholm: SOU, 1963: 22.

Ahlquist, P. *Vilka behov av engelsk språkfärdighet upplever svenskar?* (What skills in English do Swedes feel they need?). Mimeogr., 1964.

Läroplan för grundskolan. (The curriculum for the Swedish comprehensive school.) Stockholm: Skolöverstyrelsens skriftserie, 60, 1962.

Läroplan för gymnasiet. (The curriculum for the Swedish 'gymnasium'.) Stockholm: Skolöverstyrelsens skriftserie, 80, 1965.

Läroplansöversyn för grundskolan. (Revising the curriculum for the Swedish comprehensive school.) Stockholm: SÖ-förlaget, 1967.

The example has been taken from Larsson, I. *Avnämarundersökning i tyska.* (Consumer investigation in German.) Mimeogr., 1968.

1.1.2. Tolerance studies

Tolerance studies are uncommon. One example of an attempt to approach these problems is the experiment in which a group of German university students were given a selection of incorrect sentences from the investigation into the frequency of mistakes described below (point 1.2.1.). The students were instructed to write in correct German what they thought the Swedish pupils had intended to say. The result showed that semantic mistakes are the most difficult to "decode", while even serious grammatical mistakes do not lead to misunderstanding. All the students understood such expressions as "dann sagte meiner Mutti", "ich will ihr gern besuchen" or "der Schüler traf der Geschichtslehrer". Interpretation difficulties arose, however, with phrases such as "mit Wäldern an allen Zeiten" (sides — Swedish "sidor") or "in einem Treibhaus, wo ich Nelken bunte" (tie up carnations in bundles — Swedish "buntar nejlikor").

Resources and staff permitting, the project will conduct tolerance studies on a larger scale. One line of interest would be to get more or less incorrect constructions, written by Swedes studying German, interpreted by young Germans of about the same age.

Literature:

The learning of linguistic patterns is stressed in e.g.:
Guberina, P. The audio-visual, global, and structural method. In: Libbish, B. (Ed.) *Advances in the teaching of modern languages.* Oxford: Pergamon Pr., 1964.
Eriksson, M., Forest, I. & Mulhauser, R. *Foreign languages in the elementary school.* Englewood Cliffs: Prentice-Hall, 1964.

1.2. Analysis of pupils

1.2.1. Mistakes in free production

The contrast analyses dealt with in point 1.3.2. probably make it possible to predict the source of the difficulties involved in learning a foreign language. Studying the pupils' mistakes can also help, and would probably give more direct information about the difficulties, since the contrast analyses are based on the assumption that contrasts cause difficulties. The psychology of learning has shown, however, that misleading similarities may be a greater problem than direct dissimilarities.

A study of mistakes should be based on the pupils' spontaneous production, i.e. not on adapted texts, where specific difficulties can be deliberately included. This method involves certain risks, however. Pupils can avoid difficult constructions which would have fitted in well linguistically. They can even avoid saying what they really want to express, if the difficulties become too great. Despite this, free production should have first consideration in an analysis of mistakes.

An example of the directives for the construction of study material which such an analysis of mistakes can provide follows below. It is a catalogue based on the essays written by a group of pupils (taking the more specialised German course at the end of the 9th year), on the subject "was ich in meiner Freizeit tue oder tun möchte". Altogether approx. 1 700 mistakes were registered.

The frequency of the mistakes can naturally not alone decide the intensity of the training needed. The seriousness of the mistakes ought also to be taken into consideration in some way, so that spelling mistakes, for example, are judged as less

Example 2. The most important types of mistakes in free written production in German.

No. of mistakes	No. of mistakes per cent	Type of mistake
324	19	Choice of word
277	16	Spelling
180	11	Concord subject-predicate
151	9	Gender of nouns
145	9	Initial letter
119	7	Case after preposition
83	5	Word order
61	4	Mixed tenses
50	3	Plural of nouns
30	2	Strong declination of adjectives
28	2	Accusative object in other case

important. One way of deciding the importance of the mistakes is the tolerance studies named above.

Finally, it can be mentioned that proportionally the types of mistakes are spread in the same way for groups of high and low ability pupils, chosen with the regard to the total number of mistakes in their compositions. This is an important observation. Furthermore, the mistakes should be judged with regard to the opportunities for making mistakes, e.g. concord mistakes with regard to the number of times subject + predicate occurs. See the two following reports on such detail studies.

Literature:

Engh, B. Feltyper och felfrekvenser i en grupp gymnasieelevers skriftliga prestationer i ämnet tyska. (Types of mistake and frequency of mistakes in the written work in German of a group of pupils in the 'gymnasium'.) *Pedagogisk-psykologiska problem* (Malmö: School of Education), No. 57, 1968.

— Feltyper och felfrekvenser i åk 9 vid fri skriftlig produktion i tyska. (Types of mistake and frequency of mistakes in free written production in German in grade 9.) *Pedagogisk-psykologiska problem* (Malmö: School of Education), No. 72, 1968.

1.2.2. The auditory perception of language sounds

Tests for auditory perception or the distinction of language sounds are to be found in several different batteries for linguistic aptitude. Usually, what phoneticians call "minimal pairs" are used, i.e. pairs of words or short series of words which only differ on one single point. The test should be constructed on the basis of phonetic analyses of the contrastive type.

1.2.3. Pronunciation

It is not altogether simple to test pronunciation satisfactorily. Pronunciation can be tested by repetition of a given word, but it should also be tested without the word being given first. Words containing the critical sounds can be given in the written form, but it has been shown that this results in a sound production which follows Osgood's paradigm, i.e. identical stimuli with different responses produce a maximum frequency of mistakes, while completely new sounds in the foreign language appear to be easier. That kind of high frequency of mistakes is demonstrated when Swedish pupils read German words. The voiced s, as in "Rose", and s pronounced as a sh-sound, e.g. in "spät", are then the most difficult sounds. Pictures are the most neutral stimuli, but a severely limited vocabulary can make it difficult to get the pupil to say the desired word.

1.2.4. Previous knowledge

The previous knowledge of pupils who begin studying a foreign language in school is usually extremely slight. This has been proved to be the case with pupils who have chosen to read German in grade 7. This provides a rather favourable teaching situation for the first lessons, since all the pupils can begin with the same elementary material. Another kind of previous knowledge is also of interest, namely acqaintance with the concepts used in linguistic analyses, such as parts of speech and parts of sentences. Textbooks in foreign languages ought obviously to be written with regard to the pupils' earlier stock of grammatical concepts and terms.

Literature:

For the more technical aspects see Hayes, A. S. *Language laboratory facilities.* Washington, D.C.: U.S. Government Printing Office, 1963.

It is important that the language laboratories maintain a high standard of sound reproduction. On this see Freeman, M. Z. & Buka, M. Effect of frequency response on language learning. *AV Communication Rev.*, 1965, *13,* 289—295.

On control of recordings by means of mingogram or spectrogram, see Hadding-Koch, K. & Petersson, L. *Instrumentell fonetik.* (Experimental phonetics.) Lund: Gleerups, 1965.

Tests of Swedish pupils' distinction of German phonemes plus previous knowledge of and attitudes to German are reported in Lindell, E. (Ed.), Språkprojektet "Tyska, 7" läsåret 1965—66: II. Elevförutsättningar och teknisk utrustning. (Language project "German 7", school year 1965—66: II. The ability of the pupils and technical equipment.) *Pedagogisk-psykologiska problem* (Malmö: School of Education), No. 37, 1966.

Pronunciation tests have been carried out by Kitzing, K. Några malmöelevers uttal av tyska spiranter och affrikator. (The pronunciation by some Malmö pupils of German spirants and affricates.) *Pedagogisk-psykologiska problem* (Malmö: School of Education), No. 49, 1967.

An investigation of the pupils' stock of grammatical concepts and terms when they enter the secondary school is being conducted under the leadership of Andersson, E., who has preliminarily called it: Grammatiska begrepp och termer vid högstadiets början: läroboksanalyser och elevkunskaper. (Grammatical concepts and terms at the start of the secondary school: text-book analyses and pupils' proficiency.) The report will be included in *Pedagogisk-psykologiska problem* (Malmö: School of Education).

1.3. Analysis of material

1.3.1. Language frequencies

In language teaching, the subject itself gives important information about the content. It has long been accepted that vocabulary must be chosen on the basis of the frequency of the *words.* This principle does not reign supreme, however. It is intersected, for example, by the principle of chosing words which reflect the pupils' interests. The determination of word-frequency naturally depends of the material analysed. Earlier studies made of written literature have now given place to journalistic texts and the spoken language. Moreover, it is not

usual for the vocabulary of text-books to be so closely and completely scrutinised.

Literature:

Earlier studies of texts still have a part to play in the discussion of word-frequency. One example is Meier, H. *Deutsche Sprachstatistik.* Hildesheim: Olm, 1964.

A more modern list of word frequencies is Oehler, H. *Grundwortschatz Deutsch.* Stuttgart: Klett, 1966.

The spoken language is the basis of the word-lists published by Pfeffer. See e.g. Pfeffer, J. A. *Grunddeutsch. Basic (Spoken) German word list. Grundstufe.* Englewood Cliffs: Prentice-Hall, 1964.

The German Department in Lund has a project in progress on journalistic language. It is being led by Inger Rosengren and is called "Modernt tyskt tidningsspråk" ("Modern German newspaper language").

New aspects of the concept 'word frequency' are to be found in Mockey, W. F. & Savard, J. G. The indices of coverage: A new dimension in lexicometries. *IRAL: International Review of applied Linguistics in Language Teaching,* 1967.

Liljegren, I. *Studier av ordförrådet i läroböcker i tyska för årskurs 7.* (Studies of the vocabulary in text-books in German for grade 7.)

More recently the use of such concepts and terms as "immediate constituents", "structure grammar" and "generative grammar" has increased the interest in studies of frequencies of *structures* or grammatical constructions or whatever one prefers to call them. Frequency calculations of that type are still rather uncommon. A great amount of work has to be carried out in the form of sentence analyses before it is possible to make the calculations. These in their turn require data processing. The sentence analysis can include both parts of speech and parts of sentences.

The sentence analyses are done by noting both single words and parts of sentences. The following indications have been used in the project in a study of modern German journalistic language:

Notation of *word, noun*:
part of speech, gender, case, number, type of pronoun
Notation of *word, verb*:
part of speech, tense, person number, mood, voice, number
Notation of *part of sentence*:

part of speech, sequence+governing word; part of sentence, after that the same as for noun, respectively verb.

Many questions which are of importance for the production of study material can be answered by means of a frequency study like that referred to above. How often do the different types of object occur? How common is the two-object construction? How often do different kinds of adverb occur? How common are the various case constructions? How common are the different tenses? How often is "an, auf . . ." followed by the accusative, dative respectively? Stating the "number" of the verb makes it possible to calculate how often "brackets" between finite and infinite verb forms is used. This also throws light on the word-order, which is often different in German and Swedish.

Literature:

Sigurd, B. *Språkstruktur* (Language structure.) Stockholm: Wahlström & Widstrand, 1967.

Halliday, M. A. K., Mc Intosh, A. & Strevens, P. *The linguistic sciences and language teaching.* London: Longmans, 1964.

Strevens, P. D. *Papers in language and language teaching.* London: Oxford Univer. Pr., 1965.

Herdan, G. *The advanced theory of language as choice and chance.* Berlin: Springer, 1966.

Hornby, A. S. *A guide to patterns and usage in English.* London: Oxford Univer. Pr., 1962.

Mackey, W. F. *Language teaching analysis.* Bristol: Longmans, 1965.

Rosenberg, S. *Directions in psycholinguistics.* New York: MacMillan, 1965.

The example has been taken from Nilsson, B. Strukturfrekvenser i tyskt tidningsspråk. (A study of grammatical structure frequencies in modern German journalistic language ["Bildzeitung"]: Method construction and pilot studies.) *Pedagogisk-psykologiska problem* (Malmö: School of Education), No. 88, 1969.

1.3.2. Contrast analyses

Investigations of the contrasts between the mother tongue and the foreign language provide one way of finding the points on which language teaching should concentrate. It is thought that the pupils probably experience difficulties when linguistic habits differ. A complete contrast analysis of two languages

would be an immense task. The results available today, therefore, apply only to limited phenomena. Contrast analyses of the number of phonemes in the respective languages are relatively common. In some cases analyses have been made of other linguistic phenomena, but they have been based on rational considerations rather than on systematic empirical evidence.

One example of a contrast analysis of a limited linguistic phenomenon is a study which has been made of word-order in German and Swedish in two texts with exactly the same factual content and number of clauses. The contrast analysis had an immediate effect on the construction of study material. The word order proved to be different in almost exactly half the clauses, and exercises with differences were introduced at an early stage.

As mentioned above (point 1.2.2.), it is possible that inventories of the pupils' mistakes give a more direct picture of the problems involved in learning.

Literature:

These two papers, from a series called "Contrastive structure series", deal with different phenomena:

Kufner, H. L. *The grammatical structures of English and German.* Chicago: Chicago Univer. Pr., 1963.

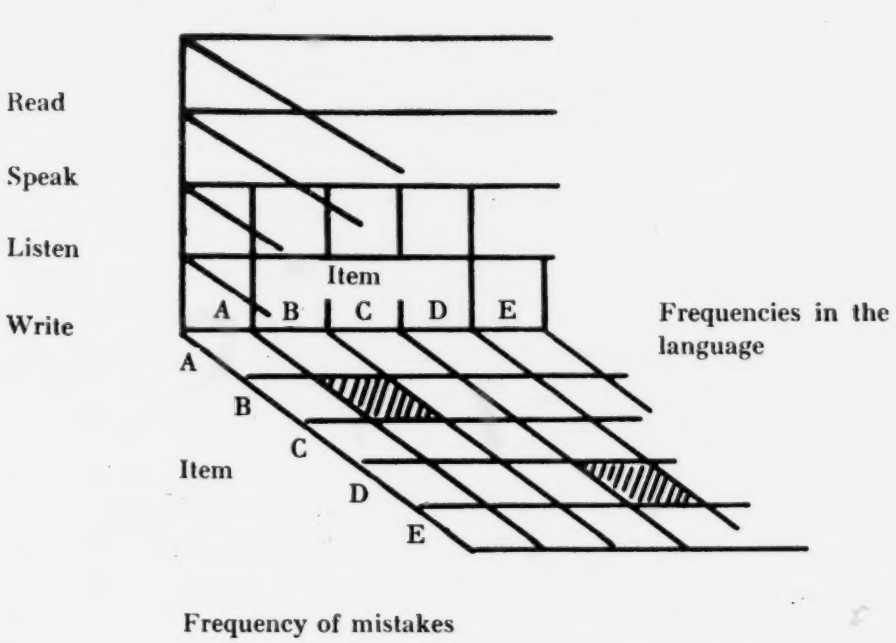
Moulton, W. G. *The sounds of English and German.* Chicago: Chicago Univer. Pr., 1963.

A contrastive study of word-order is reported in Grunewald, G. En studie av ordföljden i tyska och svenska. (A study of word-order in German and Swedish.) *Pedagogisk-psykologiska problem* (Malmö: School of Education), No. 59, 1968.

1.4. Summary of goal, pupil and language analyses

The following diagram attempts to integrate consumer investigations, analyses of mistakes and linguistic frequency calculations. The axes show only the division into categories, so that no kind of rising numeral value from the centre and out is given. Some areas are shaded, where studies of frequency and mistakes both suggest that special attention and practice is necessary. The requirement axis gives a third dimension: in which situations should the factors be practiced?

Example 3. Model of the method for deciding the content in language teaching.



1.5. Feedback of the teaching results to the analysis of prerequisites

In a discussion on the prerequisites for teaching, mention should be made of the feedback which is obtained through a continuous follow-up of the pupils' results. This can be done by revising and checking the study material as a whole for small groups of pupils, and by diagnostic tests for larger numbers of pupils. A very weak result can suggest not only that the study material needs revising to improve the rate of learning, but also that the target has been set too high and that certain items should be left for a while. Thus the teaching results themselves decide the prerequisites for the arrangement of the material.

2. Analysis of the educational process

The need for process and method research within language teaching is very great. Our search for literature has shown that the empirical foundation for certain principles of method — implied in the sub-headings below — is extremely small, if it exists at all. It is revealing that a scholar like Carroll, in an article on research in language teaching, pointed out the need for method experiments.

2.1. The sequence of items in language teaching

As stated above, we are here concerned with a task for teachers or experts on methods, after the content of the teaching has been decided. The suggestions made in the national curriculum of items to be dealt with in the various grades can be seen as just such a determination of sequence. Analysis of text-books also makes it possible to establish the main features in the presentation of the material, but this requires content analyses of the kind conducted earlier in Sweden by e.g. Bromsjö in civics. It should be kept in mind that this determination of sequence will reflect a tradition and that it may be questionable.

As an example of what the scrutiny of language text-books can lead to, we have chosen two analyses, one made in grade 7, the other in grade 8, both in German. In the following table, the heading "existence" denotes how often the item occurs in the 10 books analysed, "frequency" in how many sections it is treated. In order to get the average and the range of variations in a common frame, the section numbers have been converted to a hundred-point scale.

The authors of the text-books deal in a similar way with items such as the indefinite article, which is placed early, and prepositions with the dative or accusative, which are placed late. On the other hand, they vary greatly in their treatment of possessive and demonstrative pronouns, which are spread throughout the entire school-year.

In grade 8 the determined sequences often disappear and points of grammar can, depending on who writes the textbook,

Example 4. An extract from the content analyses of text-books in German for grade 7.

Item	Existence	Frequency	Average and range of variations
1. Indefinite article+noun in singular	10	25	2 9 22
2. Indefinite pronouns: kein	7	17	2 11 24
3. Possessive pronouns	10	27	2 42 88
4. Definite article+noun in singular	10	29	2 10 33
5. Demonstrative pronouns: dieser, der da	10	14	4 16 74
— — —			
15. Accusative object: article+noun	10	21	17 44 67
16. Preposition with accusative or dative	10	22	46 77 95

Example 5. An extract from content analyses of text-books in German for grade 8.

Item	Existence	Frequency	Average	Range of variation
Perfect of strong verbs	6	36	52.8	3 — 100
Imperfect of strong verbs ..	6	33	45.4	3 — 100
Present of strong verbs ...	6	32	44.4	3 — 95
Perfect of weak verbs	6	26	54.5	5 — 100
Perfect of temporal auxiliaries	6	13	46.4	5 — 87

be trained at any point during the school-year. In six of the text-books, certain points concerning verbs were spread out as seen in Example 5. It can be seen that each item covers almost the entire range of variation.

The tendencies shown in both classes are of interest for the production of study material. The established practice appears to be to demand a fixed succession of items only during the first year. After that, the order in which the more advanced points of grammar are taken is rather indifferent. In any case, the grammatical points get spread out quite naturally when the pupils have reached the stage of being able to study texts which were not specially composed for the purpose of language teaching.

Engh's and Schwandt's work has also revealed the fields of interest presented to the pupils. They have found the following fields for grades 7 and 8 respectively, although unfortunately the division has not altogether followed the same principles.

Example 6. Fields of interest in text-books for grades 7 and 8.

Grade 7	*Grade 8*
1. The home	1. Geography
2. Traffic (public transport)	2. The family
3. Entertainment	3. Journeys and excursions
4. Telling the time and numerals	4. Post
5. School	5—9. Shopping, provisions, luxuries, motoring, currency
6. Geography	
7. Mass media	
8. Science	

These are the fields of interest which occur today. An investigation of the pupils' interests ought to be of importance before the planning of new study materials. Such investigations, based on questionnaires, are at present being planned within the German project.

Literature:

The method used in making analyses of content is presented in e.g. Travers, R. *An introduction to educational research.* New York: MacMillan. 1964.

Kerlinger, F. N. *Foundations of behavioral research.* New York: Holt, 1966.

Bromsjö, B. *Samhällskunskap som skolämne.* (Civics as a school subject.) Stockholm: Svenska Bokförlaget, 1960.

The examples from German text-books were taken from:

Lindell, E. (Ed.) Språkprojektet "Tyska, 7" läsåret 1965—66: I. Målen för undervisningen. (The language project "German 7" school year 1965—66: I. Teaching objectives.) *Pedagogisk-psykologiska problem* (Malmö: School of Education), No. 35, 1966.

Schwandt, E. Innehållsanalyser av läroböcker i tyska för grundskolans årskurs 8. (Content analyses of text-books in German for grade 8 of the comprehensive school.) *Pedagogisk-psykologiska problem* (Malmö: School of Education), No. 66, 1968.

Problems concerning "logical" and "psychological" sequences of items is mentioned in a survey, Tanner, D. Curriculum theory: Knowledge and content. *Rev. educ. Res.,* 1966, *36,* 362—372. See also Bruner, J. S. Needed: A theory of instruction. *Educ. Leadership,* 1963, *20,* 523—527.

2.2. Problems of research method in experimental studies

Some experiments being conducted today are of a highly formalised type and can be considered satisfactory from the point of view of experimental theory. The best examples can perhaps be found in the 'Journal of Verbal Learning and Verbal Behavior'. The strict isolation of the problems and the experiment situations, however, leaves those who construct study material rather at a loss when it comes to the application of the results. The other extreme is the practical experiments in school classes with an "evaluation" consisting of a few vague opinions on what "experience has shown". Probably method experiments made prior to the production of study material will have to lie between these two extremes. This middle course has recently been described by Bjerstedt. In some cases, the teaching situation necessitates experiments of the "quasi-experimental" type. Experiments concerning the effect of teaching in a language laboratory are often of this type. This means that, because of the practical problems involved, experiment and control groups must be made up of whole classes, with all the difficulties of assessment which that entails. This is a suitable point for a reminder of the description of development work without a fully experimental basis given by Guba, who also suggests possible ways of assessment.

Literature:

Carroll, J. B. Research on teaching foreign languages. In: Gage, N. L. (Ed.), *Handbook of research on teaching.* Chicago: Rand McNally, 1963. Pp. 1060—1100.

Bjerstedt, Å. *Skolan och det pedagogiska utvecklingsarbetet.* (The school and the work on educational development.) Lund: Gleerups, 1968.

Campbell, D. T. & Stanley, J. C. Experimental and quasi-experimental designs for research on teaching. In: Gage, op. cit. Pp. 171—246.

Stukát, K. G. *Pedagogisk forskningsmetodik.* (Methods for educational research.) Stockholm: Almqvist & Wiksell, 1966.

Guba, E. G. *Methodological strategies for educational change.* Mimeogr., 1965.

2.3. Methods of imparting knowledge and proficiency

2.3.1. With or without text?

Several important personages in the field of language methodology have claimed that the first presentation of a foreign language should be "audio-lingual", i.e. the pupils should not see any text. Nelson Brooks, Wilga Rivers and representatives of FLES are among those who are of that opinion. The experts of the Council of Europe have earlier expressed a similar point of view. The Swedish curriculum for the comprehensive school gives a slightly guarded recommendation of a period without the reading of text. — Among the sceptics, who point out the theoretical weaknesses of this procedure and ask for empirical proof, are to be found Carroll, Marty and Stern. To quote the last-named: "once a child has learnt to read and write it is fictitious to treat him as a non-reader. We can prevent him from seeing the language in writing, but we cannot prevent him from imagining it written in terms of his native language. The graphic element admittedly may interfere and produce grotesque misinterpretations. But it also helps and clarifies. By all means, let us have a 'time lag' but let us treat it as an experimental variable not as a matter of dogma".

The absence of text was treated as an "experimental variable" in an experiment with beginners in German, an experiment which can serve to exemplify research with direct relevance to the construction of study material. 10 classes participated, with exactly the same material. 5 worked without text,

5 had access to text. After 10 lesson periods a test battery was given. This revealed a few significant differences and a series of tendencies, mostly to the advantage of the group with text.

The close connection with the production of study material should be emphasised: the work is conducted at the same level, with the same selection of pupils and with the same language as that for which the study material is to be produced. The lack of experimental stringency in whole class experiments can at least partly be compensated by the avoidance of difficult generalisations from more formal experiments.

Literature:

Brooks, N. *Language and language learning.* New York: Harcourt, 1960.

Rivers, W. *The psychologist and the foreign language teacher.* Chicago: Univer. Chicago Pr., 1964.

Council for Cultural Co-operation of the Council of Europe. *Recent developments in modern language teaching.* Strasbourg, 1964.

Carroll, J. B. Op. cit.

Eriksson, M. et. al. Op. cit.

Marty, F. *Programing a basic foreign language course.* Hollins College, 1962.

Stern, H. H. A foreign language in the primary school? In: *FLES packet. A compilation of materials on the teaching of foreign languages in elementary school.* New York: Modern Language Association, 1964.

Lindell, E. (Ed.) Med eller utan text? Empirisk belysning av en stridsfråga beträffande nybörjarundervisning i främmande språk. (With or without text? Empiric elucidation of a controversial issue concerning the teaching of foreign languages to beginners.) *Pedagogisk-psykologiska problem* (Malmö: School of Education), No. 41, 1966.

An experiment at the university level has been reported by Scherer, G. & Wertheimer, M. *A psycholinguistic experiment in foreign-language teaching.* New-York: McGraw Hill, 1964.

What is probably the largest and one of the best-controlled experiments in language method is reported by Smith, P. O. & Berger, E. *An assessment of three foreign language teaching strategies utilizing three language laboratory systems.* Washington, D.C.: U.S. Department of Health, Education and Welfare, 1968.

2.3.2. Ways of using language laboratories

There is now an abundance of papers on the technique of using language laboratories. Unfortunately, only a few corre-

sponding investigations of the effect of the teaching there have been made, although studies of the effect should be of great importance prior to the purchase of the relatively expensive equipment. By studies of effect, we mean comparison between, for example, the results achieved by a language laboratory and by teaching with the help of a single tape-recorder, or between simpler equipment giving no opportunity for comparison and the expensive audio-active-comparative installations, where each pupil works with a tape-recorder. Positive results of teaching in language laboratories have been obtained by Lorge and by a group working in New York City; in Sweden, Stukát & Lindblad have alse given favourable reports. Class teaching emerged as the most effective in experiments conducted by Keating and in some of the experiments by Jivén and Lindell in Sweden. No differences between the ways of working within the laboratory appeared in the experiments described by Hocking and Lindell. Smith & Berger compared the three types of equipment: classroom tape-recorder, audio-active equipment without pupil tape-recorder and audio-active-comparative and could not, despite large-scale tests, indicate any gains made by use of the larger installations.

An important question to be considered before judging the effect of the language laboratories is naturally whether the training there has been used to reinforce classroom teaching. From an economic point of view, it is important to compare the results of identical exercises given with and without a language laboratory, in the latter case, for example by means of a classroom tape-recorder. For a correct total assessment of the role of the language laboratory, however, it is also important to consider the specific possibilities of individualization it may offer. So far these possibilities have seldom been systematically evaluated.

Literature:

A summary of Lorge's results can be found in Birkmaier, E. & Lange, D. Foreign language instruction. *Rev. educ. Res.*, 1967, *37*, 186—199.

The Bureu of Audio-Visual Instruction. Board of Education of the City of New York. Foreign language laboratories in secondary schools. *A-V Learning*, 1963.

Keating, R. F. *A study of the effectiveness of language laboratories.* New York: Columbia Univer., Teachers College, 1963.

Smith & Berger. Op. cit.

Stukát, K.-G. & Lindblad, T. Försök med språklaboratorieundervisning i engelska på mellanstadiet. (Experiments on teaching English in the language laboratory in grade 5.) *Skola och samhälle,* 1967, *48,* 49—62.

Jivén, L. M. Försök med språklaboratorieundervisning i tyska: Prestationsutvecklingen (I). (Experiments on the teaching of German in the language laboratory: Development of proficiency I.) *Pedagogisk-psykologiska problem* (Malmö: School of Education), No. 19, 1965.

— Försök med språklaboratorieundervisning i tyska: Prestationsutvecklingen (II). (Experiments on the teaching of German in the language laboratory: Development of proficiency II.) *Pedagogisk-psykologiska problem* (Malmö: School of Education), No. 23, 1965.

Hocking, E. *Language laboratory and language learning.* Washington, D.C.: NEA, 1967.

Lindell, E. (Ed.) Två språkpedagogiska metodförsök: I. Arbetsformer i språklaboratorium. II. Försök med en gammal paradigm. (Two experiments in methods of teaching languages: I. Ways of working in the language laboratory. II. Experiments with an old paradigm.) *Pedagogisk-psykologiska problem* (Malmö: School of Education), No. 44, 1966.

— Kombination av språklaboratorieövningar och klassrumsundervisning, ett parallellförsök. (The combination of training in the language laboratory with classroom teaching, a parallel experiment.) *Pedagogisk-psykologiska problem* (Malmö: School of Education), No. 50, 1967.

2.3.3. Grammatical summaries

The part played by surveys, rules and other logical summaries is an often recurring problem in many branches of pedagogy. In the case of language learning, it is a case not only of whether grammatical paradigms should be taught, but also of which grammatical model should be used. The discussion here will refer to modern linguistics theories on structural and generative grammar. So far no proper experiments have been reported comparing the command of a foreign language attained by pupils taught according to the pattern of the Latin grammar with that attained by pupils who have learnt by means of another system. In contrast to grammar teaching in general are the direct or natural methods, which aim at imprinting the linguistic structures in the same way as the mother-tongue was learnt. In this way, one is supposed to be able to avoid grammar.

As an example — or perhaps rather an observation — can be named the learning of the present tense of "sein", which was undertaken with a group of beginners in German in Malmö. The pupils had been taught the item by the direct method, by means of intensive training in the language laboratory, but proved to have difficulty in understanding in which circumstances the various verb-forms should be used. After going through a paradigm, which gave the verb-forms in connection with the person and also explained by translation into Swedish, the pupils obtained substantially improved results.

The experiment was repeated in a series of lessons using the combined method (see the following section). It is important for the production of study material that the exact item that is to be included in the teaching is also included in the experiment. Generalisations from experiments conducted on a more general basis are hazardous. It is namely important that the relation between linguistic habits in the mother tongue and in the foreign language are allowed to influence the experiment. In the case of the presence of "sein", the crucial problem for the pupils in understanding the changes in the verb-forms is that they are unused to declining the predicate according the person in the subject.

Literature:

Belyayev, B. V. *The psychology of teaching foreign languages.* Oxford: Pergamon Pr., 1963.

Lado, R. *Language teaching. A scientific approach.* New York: McGraw Hill, 1964.

Brooks, N. *Language and language learning.* New York: Harcourt, 1960.

From a linguistic point of view, the need for an "insight method" has been argued by Ellegård among others (the quotation is taken from the third of the articles named here):

Ellegård, A. Är språket medfött? (Is language inborn?) *Dagens Nyheter,* Jan. 1, 1966.

— Medfödda mönster i språket. (Inborn patterns in language.) *Dagens Nyheter,* March 9, 1966.

— Tänk om i språkundervisningen. (Reconsider in language teaching.) *Dagens Nyheter,* Jan. 3, 1969.

Lindell, E. (Ed.) Två språkpedagogiska metodförsök: I. Arbetsformer i språklaboratorium. II. Försök med en gammal paradigm. (Two experi-

ments in methods of teaching languages: I. Ways of working in the language laboratory. II. Experiments with an old paradigm.) *Pedagogisk-psykologiska problem* (Malmö: School of Education), No. 44, 1966.

2.3.4. Combined methods

In a situation where many controversial opinions conflict and empiric proof only exists on certain points, it can be wise to avoid the most extreme teaching methods when planning study materials. Instead it should be possible to construct a training system which includes various linguistic activities and various ways of learning, from the first presentation of an item over induction to logical summaries, followed by over-learning in intensive speaking and reading situations, with the additional help of technical aids.

Prior to the construction of study material in German, a series of items within the first-year course were taught by means of combinations of various work-methods. The question here was one of trying out suitable teaching models, not of experimenting in a comparative sense. The assessment of the success of the teaching was made on a subjective basis, by the deciding beforehand of certain limits in the tests on the item in question. As will be shown in a later section on course diagnoses, the dispersion of points in the final test can to some extent be used as a criterion.

Literature:

Lindell, E. (Ed.) Kombination av språklaboratorieövningar och klassrumsundervisning. (The combination of training in the language laboratory with classroom teaching.) *Pedagogisk-psykologiska problem* (Malmö: School of Education), No. 46, 1967.

— Kombination av språklaboratorieövningar och klassrumsundervisning, ett parallellförsök. (The combination of training in the language laboratory with classroom teaching, a parallel experiment.) *Pedagogisk-psykologiska problem* (Malmö: School of Education), No. 50, 1967.

— Ett försök med självinstruerande material i språklaboratorium och i skriftlig programmering. (An experiment with self-instructional material in the language laboratory and in written programming.) *Pedagogisk-psykologiska problem* (Malmö: School of Education), No. 53, 1967.

Löfgren, H. (Ed.) Kombination av klassrumsundervisning och övningar av språklaboratorietyp: Exempel på första utprövning av en undervis-

ningsenhet. (The combination of classroom teaching and training of the language laboratory type: Examples from the first test of a teaching unit.) *Pedagogisk-psykologiska problem* (Malmö: School of Education), No. 52, 1967.

2.3.5. Word lists

The vocabulary of a foreign language can be learnt in different ways: by means of real objects, actions or situations, by pictures, by translation or by explanations in the foreign language. In the last case, a certain knowledge of the language concerned is obviously a prerequisite. The avoidance of translation when explaining words is one element of the method which demands that all teaching should be carried out in the foreign language. This would appear to be a desirable objective. Sometimes, however, the demand for unilingual teaching results in puritanism. This is all the more regrettable since, so far as is known, there is an almost complete lack of evidence that complete unilingual teaching is the most effective way to teach the vocabulary of a foreign language.

A more definite answer to the question of the effectiveness of unilingual teaching could only be obtained after a long-term period of experiment, which would be very difficult to organise and control. Shorter experiments can, however, give hints of considerable value for the production of study material. Löfgren's experiments in German are worth mentioning here. They show not only that the immediate comprehension is better with bilingual word-lists than with unilingual, but also that the bilingual group's superiority is maintained when tested after an interval of time. Löfgren has also shown that the byproducts which one could in theory expect from the use of unilingual word lists, e.g. knowledge of other words in the foreign language given in the unilingual explanations, do not seem to occur to the extent that they justify the unilingual method.

It is easy to differentiate insufficiently between two stages in the learning of words: understanding and training. It would appear rational to impart understanding of a new word as quickly and precisely as possible and this can often be done through translation instead of through interpretation of a uni-

lingual explanation, which offers scope for misunderstanding. On the other hand, the new word should then be practised in unilingual situations to the greatest possible extent.

In a later experiment, Hall has shown that during the first term spent studying a foreign language, again German, the effectiveness of three types of word explanations was graded as follows: explanation by means of pictures, explanation by pictures+translation, translation alone, that is bilingual explanation. Strangely enough, the double explanation, picture+word, conveys less than pictures alone. Probably there is a fluctuation of attention here, which makes learning more difficult (on this see the paper by Travers mentioned above). The motivation of the pupils is probably an important factor in the good result, since it is more stimulating to learn via pictures, at least during a short experiment. Picture learning is also limited to relatively few words, almost solely concrete nouns.

The next stage planned is a repetition of the experiment at a more advanced level, where the pupils' vocabulary will be large enough to permit the inclusion of a unilingual word list in the experiment.

Literature:

Löfgren, H. Försök med en- och tvåspråkiga ordlistor. (Experiments with unilingual and bilingual word-lists.) *Pedagogisk-psykologiska problem* (Malmö: School of Education), No. 29, 1966.

— Försök med två olika typer av ordlistor. (Experiments with two different types of word-list.) *Pedagogisk-psykologiska problem* (Malmö: School of Education), No. 62, 1968.

Hall, P. Bildens roll vid ordinlärning. (The role of the picture in word learning.) *Pedagogisk-psykologiska problem* (Malmö: School of Education), No. 78, 1969.

In other countries, experiments with unilingual and bilingual word lists seem to be very uncommon. We have succeeded in tracing one experiment, conducted nearly 40 (!) years ago, which lasted longer than the one in our project but gave substantially the same result. Seibert, L. An experiment on the relative efficiency of studying French vocabulary in associated pairs versus studying French vocabulary in context. *J. educ. Psychol.*, 1930, *21*, 297—314.

An experiment with picture word lists, also with largely the same result as our's, is reported in Grosslight, J. H. & McIntyre, C. J. *Exploratory studies in the use of pictures and sound for teaching foreign language vocabulary.* Pennsylvania State Univer., 1955.

2.4. Attitudes to different methods of working

While method experiments help to establish the ways in which teaching can be made effective, inquiries made among the pupils can show how those studying react to the methods. These attitudes are important. We get better results if the methods can be made attractive to the pupils. In recent years, research in this field has been carried out in connection with the construction of programmed material. Traweek has reported one such experiment, in which the effectivity of various methods was compared with the pupils' personality characteristics.

Pupils in Malmö, who had studied German for one year, were given a questionnaire listing about twenty different activities and asked to place them on a three-point scale: enjoyable, neutral, dull. The informal activities, such as acting and writing a class-newspaper came at the top of the list, together with training in the language laboratory. More formal exercises, such as the learning of vocabulary and reading in chorus, were not particularly popular. The investigation was repeated the following school-year with a new group of pupils, who in addition were asked for their opinions on the value of the activities. The result has recently been presented. It shows, among other things, that pupils class as valuable some activities which they at the same time consider rather dull. This is important for those constructing study materials, since they can more readily include less popular exercises if the pupils accept them as useful. We also hope to get the chance to relate the linguistic exercises to the pupils' personality characteristics in certain respects. After all, the opportunity given to socially insecure pupils to do themselves more justice is usually counted as one of the advantages of the language laboratory and programmed instruction.

Literature:

Traweek's study has been summarised in Phillips, M. G. Learning materials and their implementation. *Rev. educ. Res.*, 1966, *36*, 373—379.

An investigation made in Malmö has been reported by Lindell, E. (Ed.) Elevattityder mot olika arbetssätt i tyska. (The attitudes of pupils to various ways of working in German.) *Pedagogisk-psykologiska problem* (Malmö: School of Education), No. 58, 1968.

The second investigation has been reported preliminarily in a paper: Magnusson, G. Elevattityder mot nytta och nöje av olika arbetssätt i språkundervisningen. (The attitudes of pupils to the value and enjoyment of various ways of working when learning foreign languages.) Manuscript, 1968.

3. Analysis of products

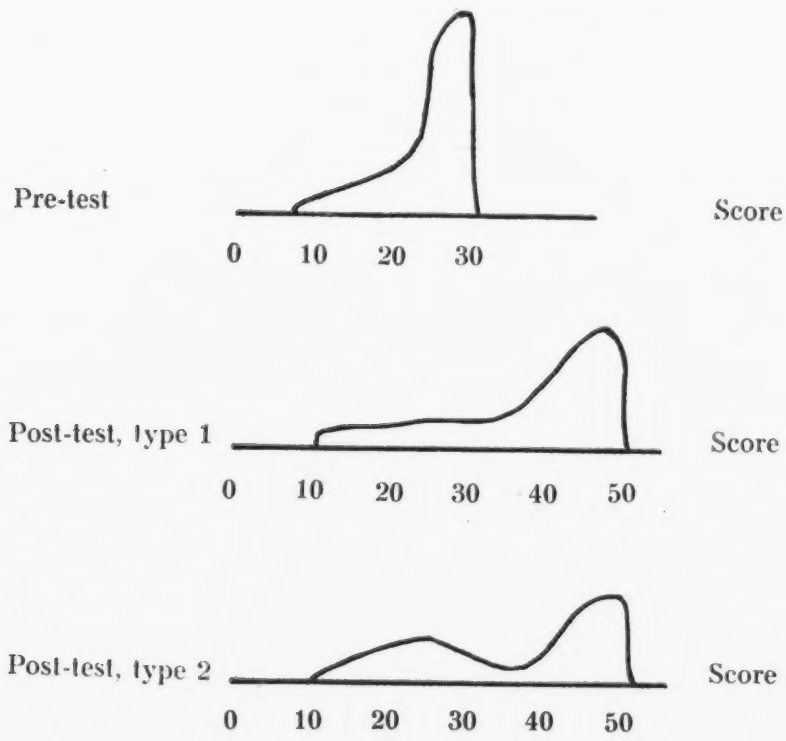
3.1. Course diagnoses

There is good reason for giving two kinds of diagnostic test, called course diagnoses here. One type can be given as part of the study material, is done by the pupils when they themselves wish and is corrected by them. The other kind lies outside the material at the pupils' disposal, is given by the teacher and enables a more exact diagnosis to be made. The course diagnoses are above all related to the objectives of the study material. This should be taken into account when the quality of their testing technique is judged.

In constructing study material, the most important factor is the *representativeness* of the content in relation to the material. The demands for *reliability* must be taken into consideration, whether the diagnoses are to be used for individual treatment in the form of supplementary exercises, revision, or extra instruction etc. When study material is being revised, demands can be less stringent, since the diagnoses often serve the purpose of showing which points in the course need reinforcing and the group result is sufficient. The demand usually made in test construction for *normal distribution* often becomes unnatural in course diagnoses. Three examples can be given to show what can happen when testing the course of teaching. All three are based on actual results. They have been obtained from experiments mentioned earlier on the teaching of the accusative of pronouns and nouns. (See Example 7.)

The first distribution came in the preliminary test, one half of which had questions with the masculine singular, the other half case and plural forms. The pupils then wrote in the nominative and got half right. In a concluding test of type 1, the majority of the pupils had profited by the teaching and

Example 7. Distribution in diagnostic tests.



had maximum marks, with a few possible exceptions for simple slips of the pen. In a concluding test of type 2, one group of pupils lagged behind and remained on the preliminary-test level. This is where attention must be concentrated: has the instruction been insufficient, is there a group of pupils who find the subject difficult? The above shows that the use of *item analyses* for choosing solution frequencies from easy to difficult items are not relevant either. On the other hand, the demand for item validity naturally remains.

The course diagnoses can be standardised and used in setting marks.

3.2. Final tests with analysis of language factors

Factor analyses of language proficiency and the course diagnoses can act as stimuli for the construction of final tests. As

an example of the work carried out with final tests at the end of the first year's study of German can be named that one battery contained a series of written tests in vocabulary and grammar, tests in listening comprehension and the spoken language. Factor analyses carried out by Löfgren revealed four factors which closely reproduced the test battery composed on a theoretical basis. The grammar tests differed from the vocabulary tests by requiring the declination of given words, while the vocabulary test involved finding words with the help of pictures or Swedish words. Löfgren is now making calculations on the results from the use of the study material and on simplifying the tests. It appears possible, for example, to transfer some auditory and spoken language tests requiring apparatus to a written form.

Literature:

Carroll, J. B. A factor analysis of verbal abilities. *Psychometrika,* 1941.

Spearitt, D. *Listening comprehension factorial analysis.* Melbourne: Green, 1962.

Löfgren, H. Mätningar av språkfärdighet i tyska: En undersökning i åk 7. (Measuring language proficiency, German: A study in grade 7.) *Pedagogisk-psykologiska problem* (Malmö: School of Education), No. 84, 1969.

See also from the UME project Wall, H. *Elevers engelska ordförråd vid slutet av åk 7.* (The pupils' vocabulary in English at the end of grade 7.) Mimeogr., 1967.

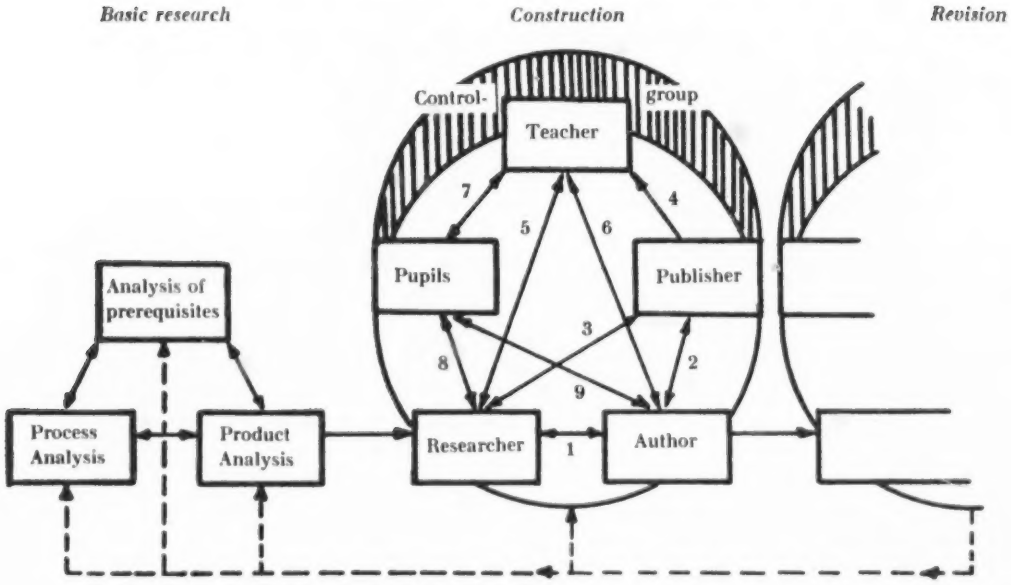
4. The process of writing and testing study materials

4.1. A model for writing and testing

The following diagram symbolises the process of step-by-step production. At a preliminary stage, as extensive as time and resources permit, prerequisites, goals and methods are analysed. The main aim here must obviously be to seek preliminary solutions to some of the most acute problems. In principle, these basic analyses should continue, so that new editions of the study material could benefit from the results obtained.

A research group established the conditions for the construction together with the authors. Their cooperation is represented by the two-way arrow 1. The researchers and the authors have

Example 8. A model for the production of study material.



discussions with the publisher (arrows 2 and 3). This contact is more important the larger the scale of the study material and is more demanding than in normal text-book production. After the teachers have been given the study material on trial (arrow 4), they stay in contact with the research team and the authors (arrows 5 and 6) by means of meetings, reports, questionnaires etc. The pupils give the teachers their opinion (arrow 7) and impulses to more formal calculations often come via the teachers. According to arrows 8 and 9, the producers finally gather results and attitudes. At this point, revision can be started. Comparisons with control groups should be possible at later stages.

This kind of model should lead to a construction which on several points fulfils the standards set for handbooks for teachers by the Council of Europe in its latest report on the teaching of foreign languages:

. . . "it would be most desirable to supplement the new integrated courses with handbooks or guides for the teacher. These handbooks would offer practical advice and suggestions on ways in which the courses might be used to the best advantage. They would include the text of all material

presented to the pupils, as well as diagnostic tests that might be used at suitable intervals. The handbooks themselves would need to be 'validated' by testing and re-testing. In their published form they would therefore represent the wisdom and experience of a large number of teachers."

It can be added that the demands for continuous reassessment expressed in the model and in the Council of Europe's report have also been stressed by Cronbach, who is of the opinion that it is more rational to assess the product in this way than to wait until it is completely ready. See also the Commission on University Education's Project MUP (stands for the Swedish "mål, undervisning, prov" = goals, teaching, tests), which publishes reports in cooperation with the Departments of English and Education in Gothenburg.

Literature:

The model is commented on in more detail in Lindell, E. Arbetsprocessen vid framställning av läromedel. (The process of producing study material.) *Skola och samhälle,* 1967, *48,* 129—133.

A model for the production and use of study material can be found in Dahllöf, U. & Wallin, E. *Läromedlen i undervisningsprocessen.* (The use of study materials in teaching.) Mimeogr., 1968.

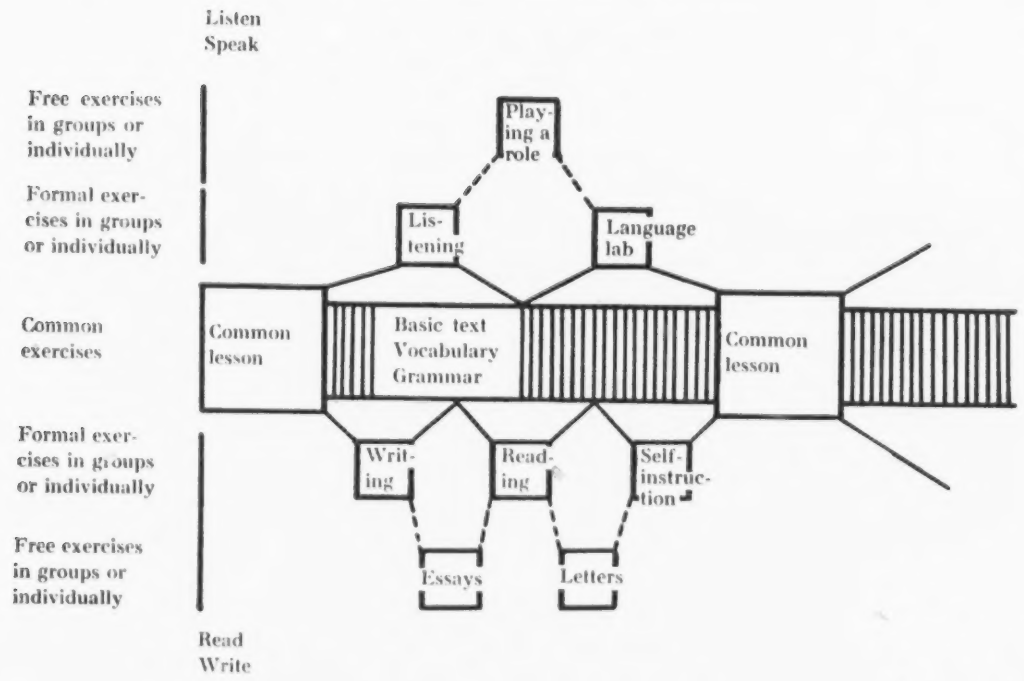
Cronbach is summarised in Abramson, D. A. Curriculum research and evaluation. *Rev. educ. Res.,* 1966, *36,* 388—395.

Gorosch, M., Pottier, B. & Riddy, D. C. *Modern languages and the world of to-day.* Council for Cultural Co-operation of the Council of Europe. Strasbourg: Aidela, 1967.

4.2. A model for the individualisation and combination of different types of exercises

The figure gives an idea of the procedure of the instruction with the help of study material of the type so far discussed. Regular teacher-led lessons are held, but in between the pupils go their own ways. There is no long-range division into courses or levels. At the same time, it should be possible to give pupils of varying proficiency stimulating activities. It has been suggested that written exercises offer a wider choice. This does not imply any evaluation of the various language activities, but simply takes into consideration the practical difficulties of giving oral exercises individually.

Example 9. A model for individualisation.



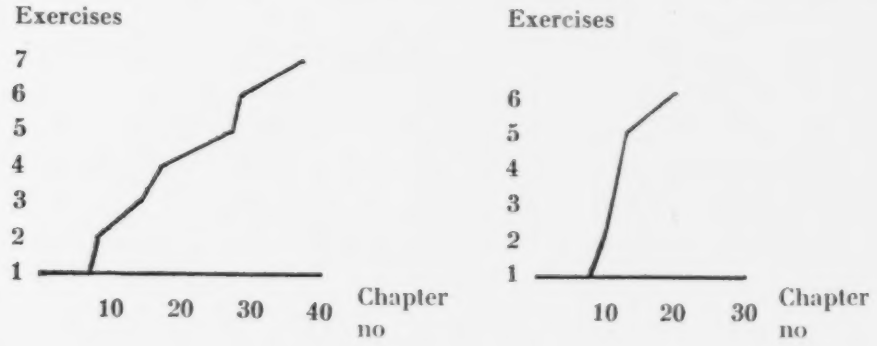
A few points need commenting:

1. *Individualisation* mostly involves penetrating the fields of interest more deeply. The motivation is that language is a means of communication, of social contact. Conversation and discussion are natural linguistic activities.

2. *The spiral principle* must also be satisfied. In the outlines given of the objectives, we have found various items which are part of the teaching. According to the spiral principle, these items recur at different levels of difficulty with repetitive exercises in various linguistic activities.

3. The *distribution* of the exercises should be observed. Example 10 is taken from the analysis of content by Schwandt named earlier and shows the way in which two text-books deal with the same item. In the light of what we know of the psychology of learning, there is reason to assume that the distribution of exercises shown in the first graph is the most effective.

Example 10. Two types of distribution of exercises on the same item.



4.3. Preliminary results from the use of a trial edition of the study material

At the moment of writing, a trial edition of the study material has been used in eight classes for one school-year. In order to check the results obtained, a final test, a "criterion test", has been constructed on the principles given in the section on product analysis. In this case, the Curriculum for the comprehensive school was taken as the starting-point for the composition of the test battery. The model below illustrates the procedure followed:

Example 11. Composition of a battery of criteria tests.

The formulation in the Curriculum	*The composition of the test battery*
The aim of the teaching in English, German and French is to make the pupils	
(1) acquainted with a limited central vocabulary,	1. Knowledge of words in bound and free form
(2) expressions and grammatical patterns,	2. Grammatical structures included in the course for each year
(3) and to lay the foundations for a good pronunciation,	3. Assessment of pronunciation
(4) so that they can follow and understand clear speech,	4. Listening and answering questions
(5) read and understand easy text,	5. Silent reading with questions
(6) express themselves in speech in simple, everyday situations	6. Spoken language in free production
(7) and to some extent express themselves in writing.	7. Writing in free production.

More than one test was given on each of these points. Depending on how one divides them up, there were between 20 and 30 sub-tests.

The study material was compared with a control group, which had been taught according to the system which is already on the market. The comparison was so favourable that revisions and continued trials seem well-motivated.

Literature:

Löfgren, H. Op. cit., 1969.